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BUREAU OF CHEMISTRY—Circular No. 90.

H. W. WILEY, Chief of Bureau.

EXTRACTS FROM THE PROCEEDINGS OF THE ASSOCIATION OF OFFICIAL AGRICULTURAL CHEMISTS, 1911.[1]

REPORTS ON THE RECOMMENDATIONS OF REFEREES.

COMMITTEE A.—J. P. STREET, CHAIRMAN.

(Nitrogen, potash, phosphoric acid, soils, inorganic plant constituents, insecticides, and water.)

PHOSPHORIC ACID.

It is recommended—

(1) That the following method of analysis (Wagner method) be adopted provisionally pending further study and the gathering of more complete data in regard to field and pot experiments.

Adopted.

WAGNER METHOD.

A. *The citric solution:* Weigh 5 grams of the basic slag; transfer to a one-half liter Wagner flask containing 5 cc of 95 per cent alcohol. The flask should have a neck width of at least 20 mm and be marked at least 8 cm below the mouth. Make up to the mark with dilute citric acid solution (2 per cent) of a temperature of 17.5° C. Fit the flask with a rubber stopper and put at once into the rotary apparatus for 30 minutes, making 30 to 40 revolutions per minute. Take off and filter immediately.

B. *Analysis of the citric solution:* As soon as the filtration is completed analyze the solution at once according to the so-called molybdate method, which in detail is as follows:

To 50 cc of the clear filtrate add 100 cc of molybdate solution made according to the official methods. Put the beaker into a water bath until the temperature reaches 65° C., take out and allow to cool at ordinary temperature. Then filter, and wash the yellow precipitate of phosphomolybdate of ammonia four or five times with 1 per cent nitric acid. Dissolve in 100 cc of 2 per cent ammonium hydroxid (cold), nearly neutralize with hydrochloric acid, and add to the solution 15 cc of magnesia mixture (made according to the official method) drop by drop during continuous stirring. After 15 minutes add 10 to 12 cc of ammonium hydroxid solution (specific gravity 0.90), then cover the beaker with a glass cover and allow to stand for about two hours. Filter the double phosphate of ammonia and magnesia through a tared platinum Gooch crucible, wash six times with 2 per cent ammonium hydroxid, dry, and proceed as customary for phosphoric acid determinations.

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[1] An advance circular giving the recommendations of referees as adopted and other action affecting the work of 1912, together with the officers, referees, and committees appointed.

(2) That further work be done with the citrate of ammonia magnesia mixture method and the official volumetric method, using the Wagner method of making the citric solution of the slag, as given under recommendation 1.

Adopted.

Citrate of ammonia magnesia mixture: Place 200 grams of citric acid and 40 grams of muriate of ammonia in a liter flask, add 200 cc of water, and then 500 cc of liquor of ammonia (20 per cent). Keep the flask stoppered until the contents are dissolved and cooled down. Then add 55 grams of muriate of magnesia and fill up to the mark with water.

(3) That the referee on phosphoric acid for 1912 study the conductivity method for making the neutral ammonium citrate solution. (See J. Amer. Chem. Soc., 1911, *33:* 711; J. Ind. Eng. Chem., 1911, *3:* 559.)

Adopted.

NITROGEN.

It is recommended—

(1) That the study of methods for the determination of available nitrogen be continued, and that the alkaline permanganate and neutral permanganate methods as now modified be studied as applied to crude stock and to commercial fertilizers.

Adopted.

(2) That the recommendation made on page 129 of Bulletin 116[1] be studied with a view to its applicability to complete fertilizers and meat products.

Adopted.

This recommendation reads as follows:

"(5) That on page 7 of Bulletin 107, after insert recommended under (4), add the following:

"Approximately 0.7 gram of mercuric oxid, or its equivalent in metallic mercury, may also be added, before the addition of the potassium sulphate, but if mercury be used potassium sulphid must be employed, as in the Kjeldahl method, in the distillation."

(3) Mr. E. L. Baker introduced a resolution to the effect that the following method for the determination of nitrogen in commercial nitrates be referred to the referee for 1912 for trial. This resolution was adopted. The method is as follows:

Determination of nitric and nitrous nitrogen (Salle, Ann. chim. anal., 1910, *15*: 103–105).—To 0.5 gram of the nitrates in a 600–700 cc flask add 200 cc of distilled water, 5 grams of powdered zinc, from 1 to 2 grams of ferrous sulphate, and 50 cc of a 36° Baumé soda solution. In the neck of the flask place some glass wool and connect with the distilling apparatus. Distil off the ammonia and collect as usual in decinormal sulphuric acid and titrate.

SOILS.

It is recommended—

(1) That the methods approved and referred to the association for final action in 1910, under recommendations 1, 2, and 3, page 3 of Circular 52, be finally adopted as official.

Adopted.

These recommendations read as follows:

(1) That the modified J. L. Smith method for total potassium be made an official method of this association, and that the clauses "and transfer to a

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[1] All bulletin references are to Bureau of Chemistry series, United States Department of Agriculture.

filter" and "after washing free of chlorids" in this method be replaced by the following sentence: "After washing four or five times by decantation with hot water, throw on the filter and wash well, 250 to 300 cc of wash water being sufficient."

(2) That the magnesium nitrate method for total phosphorus be made an official method of this association.

(3) That the sodium peroxid fusion method for total phosphorus be made an official method.

(2) That the referee on soils continue his research for a method or methods that will permit of an accurate estimation of the lime requirements of soils.

Adopted.

(3) That the Rather method (J. Ind. Eng. Chem., 1911, *3:* 660) for humus be further studied with a view to substituting it for the present official method.

Adopted.

Rather method.—Prepare the humus solution as described in the official method. Place 130 cc of soil in a glass-stoppered cylinder and add 0.65 gram of ammonium carbonate. Allow to stand overnight, filter through a dry filter into a dry flask, and measure out 100 cc for evaporation in the platinum dish. Complete as in the official method.

(4) That the modified volumetric cobalti-nitrite method be further studied in its application to soils (J. Ind. Eng. Chem., 1909, *1*: 302; Bul. 137, p. 25).

Adopted.

POTASH.

It is recommended—

(1) That the Drushel volumetric cobalti-nitrite method be further studied in its application to mixed fertilizers (Bul. 132, p. 21).

Adopted.

(2) That a further study of the gravimetric cobalti-nitrite method be made in the case of mixed fertilizers, using the modification suggested by Itano of precipitating the phosphates with milk of lime before adding the cobalti-nitrite reagent.

Adopted.

(3) That the proposed modification of the official method be approved and be referred to the association for final action in 1912.

Adopted.

The method (Bul. 107, Rev., p. 11, (2) Methods of making solution) as revised reads as follows:

Under "(a) With potash salts and mixed fertilizers," read: "Weigh 2.5 grams of the sample upon a 12.5 cm filter paper and wash with successive small portions of boiling water into a 250 cc graduated flask to a volume of about 200 cc. In the case of mixed fertilizers, add 2 cc of concentrated hydrochloric acid, heat to boiling, and add to the hot solution a slight excess of ammonium hydroxid and then sufficient ammonium oxalate to precipitate all the lime present, cool, dilute to 250 cc, mix, and pass through a dry filter. In the case of muriate and sulphate of potash, sulphate of potash and magnesia, and kainit, dissolve and dilute to 250 cc without the addition of ammonium hydroxid and ammonium oxalate."

Under "(3) Determination," second line should be changed to read 0.5 gram instead of 1 gram.

On page 12, under "(b) Muriate of potash," read "Acidify 50 cc of the solution prepared according to (2) (a) with a few drops of hydrochloric acid," etc.

Under "(c) Sulphate of potash, sulphate of potash and magnesia, and kainit," read "Acidify 50 cc of the solution prepared according to (2) (a) with a few drops of hydrochloric acid," etc.

(4) That the factors for calculating potash from potassium platinic chlorid (Bul. 107, Rev., p. 12) be revised to read as follows:

Under "(c) Factors," read "For the conversion of potassium platinic chlorid to potassium chlorid, use the factor 0.3067; to potassium sulphate, 0.3585; to potassium oxid, 0.1938." (This change is made in accordance with the new atomic weights.)

Adopted.

INORGANIC PLANT CONSTITUENTS.

It is recommended—

(1) That the molybdate method in the form in which it is now presented for the separation of ferric and aluminic oxids in an ash solution be approved, with a view to its adoption as an official method in 1912.

Adopted.

Molybdate method for ferric and aluminic oxids.—Use 50 cc aliquots, corresponding to 0.5 gram of ash, for the determination. If there is ferrous iron present, oxidize by boiling with a few cubic centimeters of hydrogen peroxid. Cool the solution, add ammonium hydroxid until a precipitate begins to form, then nitric acid until just clear, and finally add about 2 to 3 cc concentrated nitric acid in excess. Add 25 cc ammonium nitrate solution (1:1) free from phosphate, heat to 40° C., and precipitate the phosphomolybdate by adding slowly, with constant shaking, a moderate excess of the official nitric-acid molybdate solution.

The temperature of the solution should not at any time exceed 40° C., as a higher temperature has a tendency to precipitate iron and aluminum with the phosphomolybdate.

After the precipitation is made, allow the solution to stand for an hour or two at 40° C. and then for several hours at room temperature, preferably overnight.

After standing for an hour, make sure that sufficient molybdate solution has been added by pipetting 5 cc of the clear solution into an equal volume of the warm reagent. If a precipitate forms, the test portion is to be returned and more molybdate solution added. Filter and wash with about 75 cc of ammonium nitrate solution (2.5 per cent) slightly acidified with nitric acid and free from phosphate, collecting filtrate and washings.

Do not concentrate the solution, because molybdic acid will separate, which will vitiate the results, but cautiously neutralize it in a beaker with ammonium hydroxid, care being taken that the temperature does not rise above 40° C. and that the alkali is added only in very slight excess; allow to stand at the above temperature until the precipitate completely settles. Filter the clear supernatant fluid, wash the precipitate a couple of times with hot water by decantation before transferring it to the filter, and wash four or five times on the filter. Dissolve the precipitate through the filter with weak, hot nitric acid (1:5), wash the filter, and reprecipitate in the same careful manner. The same filter may be used for the second filtration, and the volume of the solution for the reprecipitation need not exceed 100 cc. Before the second filtration is made, a small quantity of finely divided ashless filter paper pulp is added in order to facilitate the washing and to leave the precipitate finely divided after the ignition, so that it can be easily fused with potassium bisulphate for the iron determination. Dry and ignite the precipitate and weigh as ferric and aluminic oxids.

If the above precipitate has been treated as indicated, the iron oxid can be readily determined as follows: Fuse it with about 4 grams of potassium bisulphate, cool, add 5 cc concentrated sulphuric acid and heat to boiling. Transfer to a flask, add water, and digest until all sulphate is dissolved and the solution is clear. Reduce with zinc, cool, and titrate with a fiftieth-normal solution of potassium permanganate. Make blank determinations on chemicals used.

If it is desired to use a larger amount of the sample for the iron determination, a suitable aliquot of the original solution can be evaporated directly with sulphuric acid, reduced with zinc, and titrated as described.

(2) That the oxalate method for the separation of ferric and aluminic oxids in an ash solution be further studied on a synthetic solution, with a view to its final adoption by the association.

Adopted.

This method reads as follows:

Oxalate method.—Use 100 cc (1 gram) of the sample, and if the iron has not been already oxidized add a few cubic centimeters of hydrogen peroxid; boil for a few minutes to oxidize the iron and expel oxygen. Add ammonium hydroxid until a precipitate begins to form, then hydrochloric acid until just clear, then 1.5 gram of powdered ammonium oxalate, boil gently for a short time, shaking occasionally to avoid bumping. Let settle, filter, and wash the precipitated calcium oxalate. Collect the filtrate and wash water in a 500 cc Kjeldahl flask, add 5 cc of concentrated sulphuric acid, and evaporate to white fumes to destroy excess of oxalic acid. Cool, add 1 gram of ammonium phosphate, 50 cc of water, and 5 cc of concentrated hydrochloric acid. Boil gently a few moments to dissolve any dehydrated ferric sulphate, boiling until the solution is clear, care being taken that the volume is not appreciably reduced. Rinse into a beaker, make up to about 150 cc volume and precipitate the iron and alumina as phosphates by adding ammonium hydroxid until just alkaline, just clearing with hydrochloric acid, and then adding 25 cc of ammonium acetate solution (sp. gr. 1.04). Or, if preferred, the solution can be treated as in the Kjeldahl flask and poured in a thin stream into the acetate solution, using sufficient water in the rinsing to bring the total volume to that indicated above. A small amount of finely divided ashless filter paper pulp is added to the phosphates, in order to facilitate the washing and to leave them finely divided after the ignition, so that they can be easily fused with potassium bisulphate for the iron determination.

Have both the ammonium acetate solution and the solution containing the phosphates at 80° C. when the two are combined. Heat the phosphates for 10 minutes at 80° C., filter, using suction, and wash with boiling hot ammonium solution (2.5 per cent) free from phosphate. Carefully ignite the precipitate without removing from the paper, at first with low flame until the paper is charred, gradually increase the heat until all of the carbon is gone, and finally blast for one minute. Deduct the iron phosphate present, calculated from the iron determination, and multiply the remainder by 0.418 to obtain the alumina.

If the precipitate has been treated as indicated, the iron oxid can be readily determined by fusing it with about 4 grams of potassium bisulphate, cooling, adding 5 cc of concentrated sulphuric acid and heating to boiling. Transfer to a flask, add water, and digest until all sulphate is dissolved and the solution is clear. Reduce with zinc, cool, and titrate with a fiftieth-normal solution of potassium permanganate. Make blank determinations on chemicals used.

If it is desired to use a larger amount of the sample for the iron determination, a suitable aliquot of the original solution can be evaporated directly with sulphuric acid, reduced with zinc, and titrated as just described.

(3) That cooperative work be done on the molybdate method as extended and described in the 1911 report for the separation of calcium and magnesium in an ash solution.

Adopted.

The method as extended is as follows:

Combine the filtrate and washings from the first and second precipitations of ferric and aluminum hydroxids, make strongly alkaline by adding 5 cc of strong ammonium hydroxid, and heat to 100° C. on the water bath. The volume at this point is probably 400 to 500 cc. Do not concentrate, but add slowly an excess of hot ammonium oxalate solution, with constant stirring, until the calcium is precipitated. Allow the beaker to remain for a few minutes on the water bath, and, after the precipitate settles, filter. The time required for the precipitation is about the same as in an ordinary calcium determination.

Dissolve the calcium oxalate in hydrochloric acid, wash the filter, and add a few drops of ammonium oxalate solution. Then add sufficient water to make a volume of about 75 to 100 cc, heat to 100° C., and reprecipitate the calcium by adding weak ammonium hydroxid slowly with constant shaking until the solution is faintly alkaline.

Combine the filtrates and washings from both precipitations of the calcium and evaporate to about 100 cc, or to as small a volume as possible, so that the salts will remain in solution on cooling. Make the solution slightly acid with hydrochloric acid, add sufficient sodium phosphate solution to precipitate the magnesium, and make the whole slightly alkaline with ammonium hydroxid. Stir or shake the solution until the precipitate forms, and then make strongly alkaline by adding 20 cc of strong ammonium hydroxid. Let stand about 24 hours, filter, dissolve the precipitate in hydrochloric acid, and reprecipitate in the same manner as before, keeping the volume as small as possible.

(4) That cooperative work be done on the method entitled "The determination of total sulphur in organic matter," described by Herman Schreiber in Circular 56.

Adopted.

WATER.

It is recommended—

(1) That the methods as proposed for the examination of waters (see Cir. 52, pp. 4 to 14) be accepted as the provisional methods of the association.

Adopted.

INSECTICIDES.

It is recommended—

(1) That the chromate method (Method II) for total lead oxid in lead arsenate be adopted as official (Bul. 137, p. 41, and Cir. 66, p. 2).

Recommendation adopted and referred to association for final action in 1912.

(2) That the method for water-soluble arsenic oxid in lead arsenate be further studied as regards time of standing for the solution of soluble arsenic, and the effect of different temperatures thereon (Bul. 107, Rev., p. 240).

Adopted.

(3) That the method for total sulphur in lime-sulphur solutions (Bul. 107, Rev., p. 34) be changed as follows: Under "2. Determination," line 1, after "Measure," insert "and accurately weigh"; after "sample" strike out "in" and insert a comma and the words "transfer to"; and that the method as thus changed be recommended for final adoption as official in 1912.

Adopted.

(4) That the gravimetric method for sulphur as sulphids and polysulphids in lime-sulphur solutions, as given in the referee's report, be adopted as official.

Recommendation adopted and referred to the association for final action in 1912.

Sulphur as sulphids.—Dilute 10 cc of the solution, prepared as for total sulphur, to about 100 cc and add ammoniacal zinc chlorid solution (prepared by dissolving 50 grams pure zinc chlorid in water and adding ammonium hydroxid in sufficient quantity to redissolve the precipitation first formed) until the sulphid is all precipitated, as will be shown by adding a drop of the clear solution to a few drops of nickel sulphate solution. Place on steam bath and heat until the odor of ammonia becomes faint, then filter and wash the precipitate. Transfer filter containing the zinc sulphid precipitate to a beaker, add 10 cc to 15 cc of a saturated solution of sodium or potassium hydroxid and heat on steam bath for about 15 minutes. Dilute with about an equal quantity of water, add 50 cc of hydrogen peroxid solution, and heat on steam bath for 30 minutes. Now make the solution slightly acid with hydrochloric acid, filter to remove paper, wash thoroughly, heat to boiling, and precipitate the sulphate with barium chlorid solution. Calculate sulphid sulphur from the weight of barium sulphate obtained.

(Make blank determinations of SO_3 in the reagents used in the determinations of total and sulphid sulphur and make correction therefor. If the hydrogen peroxid solution is not full strength, 50 cc may not be sufficient to oxidize all the sulphur compounds to sulphates, in which case more peroxid must be used.)

(5) That the volumetric method for sulphur occurring as thiosulphate in lime-sulphur solutions, as given in the referee's report, be adopted as official.

Recommendation adopted and referred to the association for final action in 1912.

Sulphur as thiosulphate.—Dilute 20 cc of the solution prepared as for total sulphur to about 50 cc in a 200-cc graduated flask. Add ammoniacal zinc chlorid until in slight excess and make to mark. Shake thoroughly and filter through a dry filter. To 100 cc of the filtrate add methyl orange and exactly neutralize with dilute hydrochloric acid. Titrate this solution with tenthnormal iodin, using a few drops of starch paste as indicator. From the amount of iodin solution required calculate the sulphur present as thiosulphate, as represented by the following reaction: $2Na_2S_2O_3+2I=2NaI+Na_2S_4O_6$.

(6) That the method given (by the referee) for sulphur occurring as sulphates and sulphites in lime-sulphur solutions be changed to read as follows and as changed be adopted as official:

Sulphur as sulphate and sulphite.—To the solution from the determination of thiosulphate add 2 or 3 drops of hydrochloric acid, warm on steam bath, precipitate with barium chlorid solution, stirring vigorously for several minutes; let stand in the cold overnight, filter, and obtain weight of barium sulphate. From this weight calculate sulphur.

(Note: In case a sulphite is present, the determination of thiosulphate will be too high. However, as calcium sulphite is nearly insoluble, it will not be present in more than traces, and the error from this cause will be negligible. The referee has never examined a sample of lime-sulphur in which the combined sulphate and sulphite amounted to more than a small fraction of a per cent.)

Recommendation adopted and referred to the association for final action in 1912.

The following recommendations, which were adopted by the association in 1909, are hereby renewed for final action:

(7) That "Method II" for total arsenious oxid in London purple, as given in Bulletin 107, Revised, page 29, be dropped from the methods of analysis.

Adopted.

(8) That "Method II" for total arsenic oxid in London purple, as given in Bulletin 107, Revised, page 29, be dropped from the methods of analysis.

Adopted.

The three following recommendations, adopted by the association in 1910, are hereby renewed for final action:

(9) That "Method I" for total arsenious oxid in London purple, as given in Bulletin 107, Revised, page 28, be adopted as official.

Adopted as official.

(10) That "Method III" as proposed by the referee in 1909 (Bul. 132, p. 43) for total arsenic oxid in London purple be adopted as official and designated as "Method II."

Adopted as official.

(11) That the Gatehouse method (Sutton's Volumetric Analysis, 9th ed., p. 201; Cir. 10, Rev., p. 6) for the determination of chlorin in cyanids be adopted as official.

Adopted as official.

(12) That the provisional methods for the analysis of lead arsenate (Bul. 107, Rev., p. 239) be changed in accordance with recommendation 7 of the referee in 1910 (Bul. 137, p. 47), and, as changed, be adopted as official.

Recommendation adopted and referred to the association for final action in 1912.

SEPARATION OF NITROGENOUS BODIES (MILK AND CHEESE).

It is recommended—

(1) That the Folin method[1] for the determination of ammonia be further studied. (Zts. physiol. Chem., 1902–3, *37*: 161.)

Adopted.

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[1] Since this work was done the Folin method has been modified by its author by using a small volume of the sample (about 10 cc) and determining the ammonia caught in the acid by the colorimeter.

(2) That the Van Slyke method for the determination of amino acid nitrogen be further studied. (D. D. van Slyke, Ber. d. chem. Gesell., 1910, *43* (3): 3170.)

Adopted.

COMMITTEE B.—E. M. CHACE, CHAIRMAN.

(Dairy products, foods and feeding stuffs, sugar, tannin, and medicinal plants and drugs.)

FOODS AND FEEDING STUFFS.

It is recommended—

(1) That the method for acidity suggested by the referee for provisional adoption, together with the method of reporting results, be studied for another year.

Adopted.

These methods are as follows:

Acidity of feeds.—Weigh 10 grams of the sample into a shaking bottle, add 200 cc distilled water, and shake for 15 minutes. Filter the extract through a folded filter and take an aliquot of 20 cc (equal to 1 gram of sample) for the titration. Dilute with 50 cc distilled water and titrate with standard decinormal sodium hydroxid solution, using phenolphthalein as indicator.

In reporting the acidity of feeds state the results in terms of cubic centimeters of the sodium hydroxid used or its equivalent in grams of sodium hydroxid.

(2) That the petroleum ether method for fat, of the Cotton Seed Crushers Association, as given in the report of the referee, be printed and studied further.

Adopted.

Extract 2 to 5 grams of the meal, without previous drying, for three hours in a Soxhlet apparatus with petroleum ether boiling under 65° C. Then evaporate off the ether, weigh the residue, and report as oil.

(3) That the study of the modification of the official method for crude fiber be discontinued.

Adopted.

(4) That the study of the proper factor for converting nitrogen into protein be continued.

Adopted.

SUGAR.

It is recommended—

(1) That Herles' solution and neutral lead acetate be adopted provisionally as clarifying agents in polarizing cane products.

Finally adopted as provisional.

These methods read as follows:

Neutral lead acetate.—Prepare a saturated solution of normal lead acetate and, as in the case of the basic lead acetate solution, add it to the sugar solution before completing to volume. Its use is imperative when determining the reducing sugars in the solution used for polarization.

Basic lead nitrate (*Herles' solution*).—(1) Dissolve 250 grams of lead nitrate in water and make up to 500 cc. (2) Dissolve 25 grams of sodium hydroxid in water and make up to 500 cc.

Add equal amounts of the two solutions (1) and (2) to the sugar solution, shake, and add more if complete precipitation has not occurred, taking care not to add an excess. Then complete the volume with water. When this solution is used for clarification, the factor in the Clerget determination becomes 143.5 instead of 142.66.

(2) That the provisional method for the determination of moisture in molasses by the refractometer be amended so as to provide for the use of a pure sucrose solution instead of water for diluting samples too dark to read. (Bul. 132, p. 178.)

Adopted.

(3) That to the official aerometric method for the determination of total solids (Bul. 107, Rev., p. 65) a note be added to the effect that the results on molasses and other materials containing large amounts of invert sugar or nonsugar solids are only roughly approximate.

Approved and referred for final adoption in 1912.

(4) That it be noted that Horne's dry lead clarification method is not an optional method but is provisional and has the same standing as the wet clarification method. (Bul. 132, p. 189, and Bul. 107, Rev., p. 40.)

Adopted.

This method reads as follows:

Dry lead subacetate (*Horne's method*).—This clarifying agent is obtained as a dry powdered salt and should contain 72.8 per cent of lead, which corresponds to a composition of $3Pb(C_2H_3O_2)_2 2PbO$. Dissolve the normal or half-normal weight of the sugar solution in a flask with water and complete the volume. Add a small quantity of the dry salt and shake, then add more and shake again, repeating until the point of complete precipitation is reached. An excess is to be avoided. Of this salt 0.1346 gram is equivalent to 1 cc of the solution of subacetate described under lead subacetate solution. When molasses or any other substance producing a heavy precipitate is being clarified, some dry, coarse sand should be added to break up the balls of lead subacetate and precipitate. (This method is to have equal weight with the use of a solution of lead subacetate in clarifying cane, sorghum, and beet products.)

(5) That the referee's recommendation as to future study be adopted, i. e., that further work should be done on the determination of moisture in sugars by means of the refractometer, on the influence of the composition of the basic lead acetate (as clarifying agent) on the polarization of sugar solutions, and on the factors used in the formula for determining commercial glucose.

Adopted.

TANNIN.

It is recommended—

(1) That the methods for the analysis of leather proposed for provisional adoption by the referee be printed with the view to subsequent adoption.

Adopted.

(These methods are as given in Bulletin 137, pages 172 and 173, with slight modifications, but in addition methods for the preparation of the sample and for the determination of ash, glucose, total solids, nitrogen, and hide substance are proposed. The method for water extract proposed for adoption is the Bureau of Chemistry method given on page 172.)

MEDICINAL PLANTS AND DRUGS.

It is recommended—

(1) That the recommendation of the associate referee as to further study of methods for mixtures of acetphenetidin and salicylates be adopted.

Adopted.

(2) That the following minor changes be made in the provisional method for caffein (Bul. 132, p. 197): That the size of the flasks in lines 3, 13, and 23 be changed from 100 cc to 200 cc; that in line 11 "Add 4 times the volume in this case 80 cc" be changed to "Add 3 times the volume in this case 60 cc"; that in line 15 "for a second extraction" be changed to "for a second and third extraction."

Approved and referred to association for final adoption in 1912.

(3) That the work on medicated soft drinks be continued.

Adopted.

(4) That the work on medicinal plants and drugs be continued.

Adopted.

COMMITTEE C.—A. L. WINTON, CHAIRMAN.

(Food adulteration.)

SPICES.

It is recommended—

(1) That further study be made of the ether extract of paprika, particularly of the index of refraction, with a view to detecting added foreign oils.

Adopted.

(2) That samples of prepared mustard of known composition be submitted to collaborators for determination of crude fiber by the present official methods.

Adopted.

CONDIMENTS OTHER THAN SPICES.

It is recommended—

(1) That such of the methods given in the report of the associate referee as seem valuable in detecting spoilage be further studied.

Adopted.

This recommendation covers principally the methods for total solids, insoluble solids, sodium chlorid, reducing sugars after inversion (Bul. 107, Rev., pp. 41, 241, and 242), total acid calculated as citric, volatile acid calculated as acetic, butyric acid (qualitative), lactic and citric acids (Cir. 78), also the value of the ratio of insoluble to soluble solids. The methods for insoluble solids and butyric acid are as follows:

Insoluble solids.—Wash 20 grams repeatedly with hot water, centrifuging after each addition of water. Pour the clear supernatant liquid through a tared double filter on a Büchner funnel. A cylinder 1 inch to 1¼ inches in diameter and 5 inches to 6 inches long is convenient for washing and centrifuging. This may be prepared by shortening a colorimeter tube. After four or five washings, transfer the remaining insoluble matter to the filter and finally dry for two hours at 100° C. The filter paper used in this determination should be dried for two hours at 100° C. before the original weighing.

Butyric acid.—Evaporate to dryness the neutralized distillate obtained under "Volatile Acids." Decompose the salts with about 5 cc of 10 per cent sulphuric acid. The acid residue thus obtained should be smelled to ascertain the presence of butyric acid.

COCOA AND COCOA PRODUCTS.

It is recommended—

(1) That methods for the determination of milk solids in milk chocolate be further studied.

Adopted.

DAIRY PRODUCTS.

It is recommended—

(1) That Paul's method of extracting fat from dairy products be further studied and that the fat obtained by this method be studied as to its chemical and physical constants.

Adopted.

Method of extracting fat from cream, ice cream, evaporated milk, and sweetened condensed milk.—Into a 1,000 cc beaker weigh 100 grams (cream, 50 grams) of the material. Add 300 cc water, mix thoroughly, and bring to a boil. Then add, while boiling, very gradually, 25 cc of Soxhlet's copper sulphate solution, diluted with 100 cc water.

In a Büchner funnel wet a filter of suitable size, and of loose texture. Filter with suction, and wash three times with a little boiling water. Filter as dry as possible. Remove the cake, which should be dry enough to be broken up easily between the fingers. Break into small particles, and dry in the open air overnight. Grind in a mortar with a sufficient amount of anhydrous copper sulphate (usually 25 grams will suffice) and let stand a few minutes, or until the product seems quite dry and not at all lumpy.

Put a layer of anhydrous copper sulphate in the inner tube of a large extractor and then add the powdered mixture. Place a loose plug of cotton on top of the mixture, and extract with ordinary ether. The ether should be poured into the extractor and allowed to percolate through before the heating is commenced. Approximately 50 cc of the solvent will be required. Dry and weigh the fat.

NITROGENOUS BODIES (MEAT PROTEINS).

It is recommended—

(1) That in Bulletin 107, Revised, page 108, 7 (a), there be added the following sentence: "If desired, 5 to 7 grams of potassium sulphate may be added in addition to the mercury of the Kjeldahl method."

Approved and referred to the association for final action in 1912.

(2) That the same modification of the Kjeldahl method be recognized as provisional for meat extracts, Bulletin 107, Revised, page 114, 7 (a).

Approved and referred to the association for final action in 1912.

(3) That the referee for next year make a further study of the separation of nitrogenous bodies (meat proteins).

Adopted.

WATER IN FOODS.

It is recommended—

(1) That the referee for next year make a comparison of the vacuum method (Bul. 122, p. 219) with the official methods for the determination of moisture in foods; and that he study other desiccating agents than sulphuric acid.

Adopted.

VINEGAR.

It is recommended—

(1) That the method quoted by the associate referee for glycerin (Ross, Bul. 137, pp. 61–63) be adopted as provisional.

Adopted.

(2) That the provisional method for pentosans (Bul. 107, Rev., p. 54) be applied to vinegar, with the direction for the use of the proper amount of hydrochloric acid to allow for the water in the vinegar.

Adopted.

(3) That the other methods proposed by the referee be continued for future study. (These are essentially the methods as given in Bulletin 107, Revised, only certain minor changes having been made.)

Adopted.

CEREALS.

It is recommended that the following action be taken in regard to the establishment of methods for the examination of wheat flour:

(1) That the method for the determination of moisture given in Bulletin 107, Revised, page 38 (1), be made official for wheat flour, and that a further study be made of the efficiency of the vacuum desiccator as compared with the vacuum oven.

Adopted; referred to association for final action in 1912.

(2) That Method B of the associate referee's report for the determination of ash be made a provisional method.

Adopted; referred to association for final action in 1912.

Method B.—Char a convenient weight of the original sample, approximately 5 grams, in a platinum dish, in a muffle, at the lowest possible temperature, until free from carbon. If carbon-free ash can not be obtained, owing to its fusibility, cool, add a small quantity of water, warm slightly, drain the more soluble portion of the ash from the carbonaceous residue, carefully dry, and reincinerate to constant weight.

(Note: A few drops of nitric acid may be added; but if so, the ash must be carefully fused until all evolution of gases ceases, or slightly high results are likely to be obtained.)

(3) That methods for the determination of the acidity of the water extract of flour be further studied with reference to the temperature of the water and time of extraction.

Adopted.

(4) That the method for the determination of the ether extract given in Bulletin 107, Revised, page 39, 5 (b) (1), be made official.

Approved and referred to the association for final action in 1912.

(5) That the methods of Bryan, Given, and Straughn (Cir. 71) for the determination of soluble carbohydrates be given a more extended trial.

Adopted.

(6) That protein be calculated from the nitrogen determined by the Kjeldahl or Gunning method, using the factor 5.70.

Adopted.

(7) That Winton's gasoline color value method be made provisional (Bul. 137, p. 144).

Adopted.

(8) That a study be made of methods for the determination of nitrites in flour.

Adopted.

(9) That experiments be made on the feasibility of determining acidity and nitrites in aliquots of the same water extract of flour.

Adopted.

FLAVORING EXTRACTS.

It is recommended—

(1) That the method of determining vanillin, coumarin, normal lead number, and residual color in one weighed portion, as proposed by Winton, Lott, and Berry, be provisionally adopted, changing the text of the method as adopted at the last meeting (Bul. 137, p. 68) so as to include the detail of precipitation at a standard temperature, 37° to 40° C. (Bul. 137, p. 120), and to make quantitative the provisional method for the determination of color in the filtrate, as given in Bulletin 107, Revised, page 159, 11 (b). (See following statement.)

Adopted.

Determination of color value of the extract.—Pipette 2 cc of the extract into a 50-cc graduated flask and make up to the mark with a mixture of equal parts of 95 per cent alcohol and water. Determine the color value of this diluted extract in terms of red and yellow by means of a Lovibond tintometer, using the 1-inch cell. To obtain the color value of the original extract, multiply the figures for each color by 25.

For example, a reading of 0.6 red and 2.1 yellow obtained on the diluted extract corresponds to a color value of 15 red and 52 yellow calculated to the original extract.

Determination of residual color after precipitation with lead acetate.—Determine the color value, in terms of red and yellow, of the filtrate from the lead acetate precipitate obtained in the determination of "vanillin and coumarin," using the 1-inch Lovibond cell. Multiply the reading by 2, thus reducing the results to the basis of the original extract.

In case the actual reading of the solution is greater than 5 red and 15 yellow, as may happen if the extract is highly colored with caramel, the one-half or one-quarter-inch cell should be employed and the readings multiplied, respectively, by 4 or by 8.

Divide the figures for red and yellow, respectively, by the corresponding figures of the original extract and multiply the quotients by 100, thus obtaining the percentages of the two colors remaining in the lead-acetate filtrate.

For example, if the color value of the original extract is 15 red and 52 yellow and the color value of the lead-acetate filtrate, also measured in the 1-inch cell, is 0.6 red and 2.4 yellow, then the residual color after precipitation with lead acetate calculated to the basis of the original extract is 1.2 red and 4.8 yellow, or 8 per cent of the red and 9.2 per cent of the yellow.

Calculate also the ratio of red to yellow in both extract and lead filtrate.

(2) That the preceding method for determining vanillin, coumarin, normal lead number, and residual color in filtrate, in one weighed portion of sample, be further studied next year for the special purpose of ascertaining the limits of composition of standard vanilla extracts.

Adopted.

(3) That Tolman's method for determining per cent of color insoluble in amyl alcohol (Marsh reagent) be adopted as provisional, and that the text of the method as published in the Proceedings of the Association of Official Agricultural Chemists (Bul. 132, p. 90) be inserted as (c) under "11. Test for coloring matter," in Bulletin 107, Revised, page 159. Twenty-five cubic centimeters of the sample is sufficient for the test. It is further recommended that this method be studied next year for the purpose of determining the range of values for pure vanilla extracts.

Adopted.

(4) That the provisional and other methods for the determination of benzaldehyde in almond extract be further studied, with the view to determining the reliability of the methods and also the conditions under which aldehyde is oxidized to benzoic acid in commercial extracts, as well as the extent of such oxidation (Bul. 137, p. 74; Cir. 66, p. 21).

Adopted.

(5) That Mitchell's modification of the Seeker test for ginger be further studied.

Adopted.

The method reads as follows:

Extract the dealcoholized sample and evaporate the ether as in the Seeker method (Bul. 137, p. 75; Cir. 66, p. 22). Add to the residue 10 or 12 drops of concentrated sulphuric acid and 5 mg of vanillin. Mix thoroughly by rubbing with a glass rod; then allow a few drops of water to flow down into the mixture from the side of the dish. A persisting azure-blue color indicates ginger.

(6) That the method for the detection of capsicum in ginger extract, as proposed by Doyle, modifying the La Wall method, be adopted as provisional. The Doyle method is not essentially different from La Wall's. The details of procedure, however, are such as to make the test more positive and are set forth more clearly than in the latter method.

Approved and referred to the association for final action in 1912.

The following is a condensed statement of the method:

To 10 cc of the extract cautiously add dilute sodium hydroxid until the solution reacts very slightly alkaline with litmus paper. Evaporate at about 70° C. to about one-quarter of the original volume, render slightly acid with dilute sulphuric acid, testing with litmus paper. Transfer to a separatory funnel, rinsing the evaporating dish with water, and extract with an equal volume of ether. Avoid emulsification, shaking the funnel gently for a minute or two. Draw off the lower layer and wash the ether extract once with about 10 cc of water. Transfer the washed ether extract to a small evaporating dish, render decidedly alkaline with alcoholic potassium hydroxid. and evaporate at about 70° until the residue is pasty; then add about 20 cc more of half-normal alcoholic potash and allow to stand on a steam bath until the gingerol is completely saponified Usually about one-half hour is required. Dissolve the residue in a little water and transfer with water to a small separatory funnel. The volume should not exceed 50 cc. Extract the alkaline solution with an equal volume of ether. Wash the ether extract repeatedly with small amounts of water until no alkaline reaction with litmus is given. Transfer the washed extract to a small evaporating dish, allowing the ether to evaporate spontaneously. Finally, test the residue for capsicum by moistening the tip of the finger, rubbing it around on the bottom and sides of the dish, and then applying the finger to the end of the tongue. A hot, stinging, or prickly sensation, which persists for several minutes, indicates capsicum or other foreign pungent substances.

(7) That the Street-Morrison method (Bul. 137, p. 76), and other available methods for examining and identifying the components of the total solids of ginger extracts, be a subject for study next year. Such a method is necessary for proving adulteration in alcoholic extracts of ginger.

Adopted.

(8) That the subject of the determination of oil of nutmeg in nutmeg extract be studied further and that other methods be tried next year, as both of the methods tried this year proved utterly unreliable.

Adopted.

(9) That for the determination of oil of wintergreen in wintergreen extracts both of the following methods be further studied:

First. Howard's method as described in J. Ind. Eng. Chem., 1911, *3*: 252, using cold dilute sulphuric acid (1:2) for the floating medium.

Second. Hortvet and West's method of saponifying the oil and weighing as salicylic acid (J. Ind. Eng. Chem., 1909, *1*: 90).

Adopted.

(10) That the Howard method (Bul. 137, p. 76) for the determination of oil of peppermint in alcoholic solutions, which was adopted provisionally last year, be given further study. This method has been modified, in the interests of greater accuracy, by its author, and the new method is found in J. Ind. Eng. Chem., 1911, *3*: 252.

Adopted.

FATS AND OILS.

It is recommended—

(1) That further work be done on the Emery method next year (U. S. Dept. Agr., Bureau of Animal Industry Cir. 132).

Adopted.

(2) That the provisional method for the preparation of samples be made official (Bul. 107, Rev., p. 129).

Approved for final action in 1912.

(3) That the referee for next year study the advisability of changing the official method for the determination of specific gravity at 100° to a similar method at 75° C.

Adopted.

(4) That method (c) Zeiss Butyro-Refractometer (Bul. 107, Rev., p. 132) be made official instead of provisional, as at present.

Approved for final action in 1912.

(5) That the provisional method for the melting point of fatty acids (Bul. 107, Rev., p. 135(b)), be made to include the fat as well as the fatty acids and to read as follows:

Draw the melted fat or fatty acids into a thin-walled capillary tube, 1 inch or 2 inches long, according to the length of the bulb of the thermometer used. Seal one end of the tube and allow the fatty acids to cool on ice from 12 to 15 hours. Attach to the bulb of a delicate thermometer graduated to one-fifth of a degree, immerse in a large test tube of water surrounded by a beaker of water, and heat very slowly. An apparatus similar to that indicated for use in the Wiley method, but smaller, will prove satisfactory. The point at which the substance becomes transparent should be taken as the melting point.

Adopted, final action.

(6) That method "12. Determination of free fatty acids" (Bul. 107, Rev., p. 142), be made official instead of provisional, as at present.

Approved for final action in 1912.

(7) That the Halphen reaction for cottonseed oil (Bul. 107, Rev., p. 144, 17(b)) be made official instead of provisional.

Approved for final action in 1912.

(8) That the Bechi or silver nitrate test for cottonseed oil (Bul. 107, Rev., p. 145, 17(c)) be made official.

Approved for final action in 1912.

(9) That the Baudouin test for sesame oil (Bul. 107, Rev., p. 146, 17(e)) be made official.

Approved for final action in 1912.

(10) That the Villavecchia test for sesame oil (Bul. 107, Rev., p. 146, 17(f) also be made official.

Approved for final action in 1912.

(11) That any cut appearing in the text of the chapter on fats and oils, Bulletin 107, Revised, be considered merely as an illustration and not as an integral part of the method.

Approved for final action in 1912.

REPORT OF COMMITTEE ON AMENDMENTS TO THE CONSTITUTION.

(1) The following resolution, introduced by W. A. Withers, was favorably reported by the committee and was adopted by the association:

Resolved, That compliance with section 4 of the constitution necessitates the appointment of referees and associate referees by the retiring, rather than by the incoming, executive committee.

Resolved further, That the secretary of the association is hereby requested to provide a place on the program for the announcement of the appointment of referees and associate referees.

(2) The following resolutions were introduced by O. M. Shedd and referred to the committee, with the results stated:

(a) *Resolved*, That section 4 of the constitution of this association be changed to read as follows:

"There shall be appointed by the executive committee at the regular annual meeting, from among the members of the association, a referee, and, after consultation with him, such associate referees, for each of the subjects to be considered by the association, as that committee may deem appropriate."

The committee reported unfavorably on the adoption of this resolution as an amendment to the constitution, but moved that a standing rule be adopted to the effect that the executive committee consult with each referee in the appointment of associate referees.

The report of the committee was adopted.

(b) *Resolved,* That a new section be added to the by-laws to follow section 4, and to read as follows:

"As soon as possible after the annual meeting of the association each retiring referee shall transmit a copy of his report and recommendations, together with a statement of the action taken by the association upon the same, to the referee for the next year."

The committee reported this amendment favorably as an addition to section 4, and the report was adopted.

(c) *Resolved,* That paragraph 3 of the by-laws be amended by adding the following words:

"That the referee on each subject be ex officio a member of the subcommittee on recommendations of referees which passes upon his recommendations, but only for the purpose of such action as relates to his own work."

The committee reported the resolution unfavorably, but stated that it was the sense of the committee that, except when impossible, opportunity should be given each referee for full consultation with the committee on recommendations before final action by the committee on the recommendations of the referee.

The report of the committee was adopted and a motion to this effect carried.

[Signed] L. L. Van Slyke, *Chairman.*
Wm. Frear.
B. B. Ross.

OFFICERS AND REFEREES OF THE ASSOCIATION OF OFFICIAL AGRICULTURAL CHEMISTS, 1911–12.

President.

H. J. Patterson, College Park, Md.

Vice President.

G. S. Fraps, College Station, Tex.

Secretary.

H. W. Wiley, Washington, D. C.

Additional members of the executive committee.

R. E. Doolittle, Washington, D. C. A. J. Patten, East Lansing, Mich.

Referees.

Phosphoric acid: H. D. Haskins, Amherst, Mass.
Nitrogen:
  Determination of nitrogen: C. L. Hare, Auburn, Ala.
  Separation of nitrogenous bodies (meat proteids): A. D. Emmett, Urbana, Ill.
Potash: H. B. McDonnell, College Park, Md.
Soils: G. S. Fraps, College Station, Tex.
Dairy products: E. M. Bailey, New Haven, Conn.
Foods and feeding stuffs: W. J. Jones, jr., La Fayette, Ind.
Food adulteration: A. S. Mitchell, St. Paul, Minn.
Sugar: W. E. Cross, Audubon Park, New Orleans, La.

Tannin: J. S. Rogers, Washington, D. C.
Insecticides: S. D. Averitt, Lexington, Ky.
Inorganic plant constituents: W. H. McIntire, Knoxville, Tenn.
Medicinal plants and drugs: L. F. Kebler, Washington, D. C.
Water: W. W. Skinner, Washington, D. C.

Associate referees.

Phosphoric acid: A. J. Patten, East Lansing, Mich.
Nitrogen:
  Determination of nitrogen: B. L. Hartwell, Kingston, R. I.
  Separation of nitrogenous bodies:
    Milk and cheese: A. W. Bosworth, Geneva, N. Y.
    Vegetable proteids: T. B. Osborne, New Haven, Conn.
Potash:
  Determination: W. E. Tottingham, Madison, Wis.
  Availability: E. E. Vanatta, Columbia, Mo.
Soils: J. H. Pettit, Urbana, Ill.
Dairy products: L. I. Nurenberg, Boston, Mass.
Foods and feeding stuffs: C. S. Cathcart, New Brunswick, N. J.
Food adulteration:
  Colors: W. E. Mathewson, New York, N. Y.
  Saccharine products: J. R. Chittick, Des Moines, Iowa.
  Fruit products: H. C. Gore, Washington, D. C.
  Wine: E. J. Lea, Berkeley, Cal.
  Beer: Julius Hortvet, St. Paul, Minn.
  Distilled liquors: J. O. La Bach, Lexington, Ky.
  Vinegar: W. A. Bender, New York, N. Y.
  Flavoring extracts: R. S. Hiltner, Denver, Colo.
  Spices: R. W. Hilts, Philadelphia, Pa.
  Baking powder: Edmund Clark, Boston, Mass.
  Meat and fish: W. B. Smith, Kansas City, Mo.
  Fats and oils: H. S. Bailey, Washington, D. C.
  Dairy products: A. E. Paul, Chicago, Ill.
  Cereal products: H. L. White, Agricultural College, N. Dak.
  Vegetables: J. P. Street, New Haven, Conn.
  Condiments other than spices: W. J. McGee, New Orleans, La.
  Cocoa and cocoa products: W. L. Dubois, Buffalo, N. Y.
  Tea and coffee: M. E. Jaffa, Berkeley, Cal.
  Preservatives: H. E. Barnard, Indianapolis, Ind.
  Water in foods: H. C. Lythgoe, Boston, Mass.
  Organic and inorganic phosphorus in foods: E. B. Forbes, Wooster, Ohio.
  Heavy metals in foods: H. M. Loomis, Seattle, Wash.
Sugar: M. N. Straughn, Washington, D. C.
Insecticides: R. C. Roark, Washington, D. C.
Medicinal plants and drugs:
  Synthetic products: W. O. Emery, Washington, D. C.
  Medicated soft drinks: G. W. Hoover, Washington, D. C.
  Medicinal plants: A. E. Ruddiman, Nashville, Tenn., and H. H. Rusby, New York, N. Y.
Water: G. E. Colby, Berkeley, Cal.
Tannin: C. B. Bacon, Washington, D. C.
Inorganic plant constituents: B. E. Curry, Durham, N. H.

SPECIAL COMMITTEES.

Amendments to the constitution:

L. L. Van Slyke, Geneva, N. Y., chairman.
B. B. Ross, Auburn, Ala.
William Frear, State College, Pa.

Appropriation:

John Phillips Street, New Haven, Conn., chairman.
R. J. Davidson, Blacksburg, Va.
H. E. Barnard, Indianapolis, Ind.

Availability of phosphoric acid in basic slag:

C. B. Williams, West Raleigh, N. C., chairman.
C. G. Hopkins, Urbana, Ill.
H. D. Haskins, Amherst, Mass.
John S. Burd, Berkeley, Cal.
B. L. Hartwell, Kingston, R. I.

Food standards:

William Frear, State College, Pa., chairman.
H. W. Wiley, Washington. D. C.
H. A. Weber, Columbus, Ohio.
M. A. Scovell, Lexington, Ky.
E. H. Jenkins. New Haven, Conn.

Presentation of the question of unification of terms to the International Congress of Applied Chemistry:

R. J. Davidson, Blacksburg. Va., chairman.
C. G. Hopkins, Urbana, Ill.
W. D. Bigelow, Washington, D. C.
G. S. Fraps, College Station, Tex.
B. W. Kilgore, Raleigh, N. C.
H. J. Wheeler, Kingston, R. I.
J. T. Willard, Manhattan, Kans.

Recommendation of referees and revision of methods.

[Figures in parentheses refer to year in which appointment expires.]

A. L. WINTON, chairman.

SUBCOMMITTEE A: W. W. Skinner (1916), B. B. Ross (1914), *J. P. Street (1912), chairman, Agricultural Experiment Station, New Haven, Conn.*

SUBCOMMITTEE B: H. E. Barnard (1916), *E. M. Chace (1914), chairman, Bureau of Chemistry, U. S. Department of Agriculture, Washington, D. C.*, J. M. Bartlett (1912).

SUBCOMMITTEE C: P. F. Trowbridge (1916), C. D. HOWARD (1914). *A. L. Winton (1912). chairman, U. S. Food and Drug Inspection Laboratory, Chicago, Ill.*

Testing of chemical reagents.

L. F. Kebler, Washington, D. C., chairman.
A. L. Winton, Chicago, Ill.
B. W. Kilgore, Raleigh, N. C.

Unification of methods of analysis of fats and oils.

L. M. Tolman, Washington, D. C., chairman.
P. H. Walker, Washington, D. C.
A. Lowenstein, Chicago, Ill.

Approved:
JAMES WILSON,
Secretary of Agriculture.

WASHINGTON, D. C., *December 9, 1911.*
[Cir. 90]